

DOCUMENT RESUME

ED 141 725

CG 011 571

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 TITLE Modifying Hyperkinetic Behavior in the Classroom.
 PUB DATE Apr 76
 NOTE 10p.; Paper presented at the Annual Meeting of the Southwestern Psychological Association (Albuquerque, New Mexico, April 29-May 1, 1976)

EDRS PRICE MF-\$0.83 HC-\$1.67 Plus Postage.
 DESCRIPTORS *Attention Control; *Attention Span; *Behavior Problems; *Exceptional Children; Exceptional Child Research; *Feedback; *Hyperactivity; Learning Disabilities; Problem Children; Program Descriptions; Reinforcement

ABSTRACT

An attempt was made to modify the attending, on-task behavior of hyperkinetic children in a naturalistic school setting. The boys were taught how to "pay attention." The procedures utilized were based on previous research findings regarding the performance of hyperkinetics on a vigilance monitoring task. (Author)

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ED141725

MODIFYING HYPERKINETIC BEHAVIOR IN THE CLASSROOM

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The assessment and management of hyperkinetic children has been the focus of numerous recent investigations in special education and pediatric psychology. Our own interest in these children has developed over a decade of clinical and research activity. This research has been heavily influenced by the work of Dykman, Douglas and Sprague (see Anderson and Halcomb, 1976). Much of the past research coming from the Texas Tech laboratories has emphasized the assessment of hyperkinesis. Currently, we are focused on exploring techniques which serve to modify one aspect of the hyperkinetic syndrome, attending behavior.

Two laboratory-controlled studies provided the initial impetus for the research in the classroom. Ozolins (1974), using a computer-based vigilance task, demonstrated that hyperactive children could be taught to improve their attention spans, measured behaviorally by a decrease in the vigilance decrement. He predicted that an overaroused, hyperkinetic child would become more cautious in his/her approach to the vigilance task when given feedback regarding random errors. Auditory feedback was given each time the child made mistakes in responding to the vigilance stimuli. As a result of this feedback, the children in the experimental population appeared to do a better job of attending. On the other hand, when these same children were given feedback

* Paper presented at Southwestern Psychological Association, Albuquerque, New Mexico, April, 1976.

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regarding correct responses, their overall activity rate increased, which included extraneous responses noted as false alarms on the vigilance task. The difference in Total Errors for three feedback contingencies are shown in the first slide. Clearly, feedback of errors resulted in significantly better vigilance performance than did feedback of correct responses.

Mack (1975) followed up on Ozolins work by varying the feedback contingencies even more. His study provided additional support for the notion that feedback regarding errors helped the hyperkinetic children to improve their performance on a task requiring attention.

Since the results of Ozolins work appeared to be cross validated by Mack's findings, we decided to adapt the principles gleaned from these studies to the management of hyperkinetic behavior in the classroom. As an initial step in this direction, the decision was made to work in a quasi-classroom situation, i.e., in a space set aside in a special education classroom. The goal in this setting was to train identified hyperactive children to pay attention. To do this, special feedback instrumentation was utilized. The equipment was designed by Dr. Wm. Jarzembski, Associate Professor of Biomedical Engineering at the Texas Tech University School of Medicine.

Since the instrumentation is shop made and original in design, it will be described in some detail. A 2" X 4" black box containing five functional light emitting diodes (LED's) is placed on the child's desk. The feedback box is connected to a 4-desk control unit which is battery-powered. The control unit contains a time-counter display, a remote activation silent switch and a reset button for each of the four feedback boxes. Whenever the LED's are activated the timer starts counting

in one second increments; when the LED's are turned off the timer holds its count until the LED's are reactivated. Thus, nonattending time can be monitored from one second to as many hours as needed.

Two pilot studies employing these instruments to feedback nonattending behavior were conducted in the fall of 1975. In the first pilot run eight boys, ages 7-8, were chosen by their teachers as the most "hyper-active" children in their classrooms. Treatment and control groups were formed containing four boys each. These two groups had comparable a priori nonattending behavior in the classroom.

For three weeks the treatment group was given daily 30-minute attention training sessions during school hours. They were instructed that whenever their desk light was turned on they were not paying attention. The children were instructed to pay attention to their work, which usually consisted of arithmetic problems. The experimenter, meanwhile, monitored all four boys. Whenever a boy met the criteria for nonattending his desk light was activated. This provided the child with immediate feedback regarding nonattending behavior. In addition, at the end of each treatment session the boys were given summary feedback regarding their nonattending time for the whole treatment session. This form of feedback was charted by the boys on individualized graphs. Incidentally, we found through this charting procedure that the boys were very concerned about their own progress with respect to that of their peers.

After three weeks of treatment in this manner, a data analysis was performed. The results showed that three of the four treated children had paid strict attention to their assigned work during the treatment sessions. From the very first session, in fact, these three children

attended to their work for more than 29 of the 30 possible minutes.

Classroom behavior of all eight children was measured both before and after the attention training procedure by independent observers. No significant changes in classroom behavior were observed for either the treatment or control groups. Teachers' evaluations of the four members of the treatment group, however, indicated that this group was more attentive and less distractible after training.

A second pilot study was performed to correct procedural errors noted in the first study. All of the children referred for this study were tested on the vigilance task to verify reported attentional deficits. The four boys who performed the poorest on the vigilance task (Anderson, Halcomb, and Doyle, 1973) were selected for study. These nine and ten year olds were then paired with "normal" control children of the same age in the same classroom.

Attention training procedures were similar to those in the first pilot study, with one exception. All seat work used this time was arithmetic and each child was provided with more work than could be performed in a half hour. This modification enabled us to get work output and accuracy counts, it also prevented the children from using lack of work as an excuse for nonattending.

Nonattending behavior in the treatment group significantly decreased within the training period ($F=3.76$, $p<.001$). Also, work output during training increased with no loss in work accuracy. Classroom observation after training however, revealed no significant change in attending behavior for the treatment group. This was not the case for the control group. Their nonattending behavior in the classroom increased significantly

($t=3.37$, $p<.001$) over pre-treatment levels. Since this increase in nonattending behavior coincided with the approaching holiday season, we labelled this phenomenon the "Christmas effect".

Following the two pilot studies, Sherman initiated a third study. Based on clinical observation and research, it was thought that potential hyperkinetics could be categorized as either 1) having an attentional deficit and motoric restlessness, or 2) having no attentional deficit but being motorically restless. While the vigilance task provided a measure of attention, the dimension of motoric restlessness presented a problem. It was resolved by developing a modification of Sprague's stabilimetric cushion which could provide a measure of motoric restlessness (Sprague and Toppe, 1966). The child sat on the cushion while attending to the vigilance task. The seat was hooked electronically into the PDP8-e computer vigilance program. Thus, three dependent measures were available to assess hyperactivity and/or attentional deficits, they were, correct detections and false alarms from the vigilance task, and seat-movements or an activity count from the stabilimetric cushion. Using these measures, two groups were identified among the total group tested. Group A included the kids with attentional deficits plus motoric restlessness; Group B included those who were just motorically restless. A third group C was also identified; these kids showed no evidence of motoric restlessness or of an attentional deficit. These "normal" children were included in the present study as a comparison group.

Using an operant design, the objective was to train children to pay attention in the classroom. All three groups of children were observed

in their classrooms for five days; nonattending behavior was recorded during a half-hour math period. In order to demonstrate the functional control of the treatment, a short ABA phase was implemented. A five day baseline period was used to record the nonattending behavior of the experimental children under conditions similar to treatment conditions, i.e., the experimenters sitting near the children's study area. The experimental children again showed high rates of nonattending during this phase. The first treatment period was then implemented. During the three days of treatment the children received feedback concerning their nonattending behavior. This period was followed by a withdrawal of treatment, or extinction, phase during which conditions similar to the baseline period were reinstated.

During and following the three day treatment period, the experimental children displayed a significant decrease in nonattending behavior. However, they were still significantly more nonattentive than the Group C children.

After the ABA phase and a second observation of the groups, the final baseline and treatment periods were started. The experimental children again displayed a high level of nonattending behavior under baseline conditions. The final treatment period lasted 13 days. After this treatment period, the experimental and control children were observed for five days.

The preliminary results indicated that feedback alone is sufficient to reduce the nonattending behavior of children identified as having an attentional deficit plus motoric restlessness. Observations indicated that as a group, the experimental children showed a significant reduction

in nonattending behavior ($X^2=10.74$, $p<.001$). However, when the behavior of the two sub-groups was examined, our observations indicated that the treatment had a significant effect only on those children having an attentional deficit ($X^2=2.84$, $p=.088$). This finding is not as startling as one may think, since feedback was for nonattending behavior and not restlessness. Apparently this restlessness in the second group accounted for their high nonattending rate before treatment, and the treatment did not carry over into the last observation period, i.e., the treatment did not modify their restlessness.

Of considerable interest is the significant increase in nonattending behavior of the control children ($X^2=11.60$, $p=.001$). What caused this increase is not clear, but it should be pointed out that the last observations occurred during the week before Easter vacation. The anticipation of this vacation may account for this increase, just like the "Christmas effect" mentioned earlier. If this is the case, the experimental children were either not as excited about Easter, or found their new ability to attend to their work so reinforcing that they continued to perform at an improved level.

Classroom procedures made the collection of data on work output and accuracy difficult. The data we did collect indicated an increase in both the amount of work done each day during their math periods, and the accuracy of this work. However, neither of these increases were significant.

The results of this latest study suggest several directions for future research. First we feel that the results of the feedback treatment need to be replicated on hyperactive children from differing economic

and ethnic backgrounds. Along with this, we want to vary the length of the treatment itself to see if there is a change in behavior. We suspect that there is an optimum length of treatment that can be empirically ascertained.

Second, the success that we've had with the feedback procedure has encouraged us to teach this approach to the classroom teacher. Can teachers learn to feedback undesirable behavior without scolding? And, if they can, what will be the effect on the hyperactive child?

Third, we wonder what will be the effect of coupling feedback with other treatment modalities such as drugs and/or social reinforcement. Will the treatment effect be augmented or will the child merely become confused?

There are a host of other questions that need to be investigated in this whole area of hyperkinesis. Our research has focussed on only a few of the many variables that relate to the hyperkinetic child. The most significant contributions are yet to be made.

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